

lamp, and instructions for its operation.

[Supp. 1, 20 FR 2718, Apr. 23, 1955, as amended at 43 FR 12314, Mar. 24, 1978; 60 FR 35693, July 11, 1995]

§ 20.4 [Reserved]

§ 20.5 Conditions governing investigations.

(a) One complete lamp, with assembly and detail drawings that show the construction of the lamp and the materials of which it is made, should be submitted at the time the application for investigation is made. This material should be sent prepaid to Approval and Certification Center, RR 1, Box 251, Industrial Park Road, Triadelphia, WV 26059.

(b) When the lamp has been inspected by MSHA, the applicant will be notified as to the amount of material that will be required for the test. He will also be notified of the date on which the tests will start and will be given an opportunity to witness the tests.

(c) *Observers at formal investigations and demonstrations.* No one shall be present during any part of the formal investigation conducted by MSHA which leads to approval for permissibility except the necessary Government personnel, representatives of the applicant, and such other persons as may be mutually agreed upon by the applicant and MSHA. Upon granting approval for permissibility, MSHA will announce that such approval has been granted to the device and may thereafter conduct, from time to time in its discretion, public demonstrations of the tests conducted on the approved device. Those who attend any part of the investigation, or any public demonstration, shall be present solely as observers; the conduct of the investigation and of any public demonstration shall be controlled by MSHA. Results of chemical analyses of material and all information contained of material and all information contained in the drawings, specifications, and instructions shall be deemed confidential and their disclosure will be appropriately safeguarded by MSHA.

(d) Permissibility tests will not be made unless the lamp is complete and in a form that can be marketed.

(e) The results of the tests shall be regarded as confidential by all present at the tests and shall not be made public in any way prior to the formal approval of the lamp by MSHA.

(f) No verbal report of approval or disapproval will be made to the applicant. Approval will be made only in writing by MSHA. The applicant shall not be free to advertise the lamp as being permissible, or as having passed the tests, prior to receipt of formal notice of approval.

[Sched. 10C, May 17, 1938, as amended by Supp. 1, 20 FR 2719, Apr. 23, 1955; 43 FR 12314, Mar. 24, 1978; 60 FR 35693, July, 11, 1995]

§ 20.6 General requirements.

(a) The lamps shall be durable in construction, practical in operation, and suitable for the service for which they are designed and approved.

(b) The intensity of light, distribution of light, and battery capacity shall be adequate for the use for which the lamp is intended.

(c) Battery terminals and leads therefrom, as well as the battery gas vents, shall be designed to minimize corrosion of the electrical contacts.

(d) Bulbs and other replacement parts of the lamps shall be adequately marked as a means of identification.

§ 20.7 Specific requirements.

Two general classes of electric lamps are recognized in these requirements, namely: Class 1, those that are self-contained and easily carried by hand, and class 2, those that may or may not be self-contained and not so readily portable as the first class.

(a) *Class 1.* Class 1 includes hand lamps, signal lamps, inspection lamps, flashlights, and animal lamps which are operated by small storage batteries or dry cells.

(b) *Class 2.* Class 2 includes lamps such as the pneumatic-electric types and large battery lamps.

§ 20.8 Class 1 lamps.

(a) *Protection against explosion hazards.* Unless properly designed, class 1 lamps present two sources of probable explosion hazards: Ignition of an explosive atmosphere by the heated filament

of the bulb in case the bulb glass is accidentally broken, and ignition by electric sparks or arcs from the battery or connections thereto. MSHA's therefore, requires the following safeguards:

(1) *Safety device or design.* The lighting unit shall have a safety device to prevent the ignition of explosive mixtures of methane and air if the bulb glass surrounding the filament is broken. Alternatively, if the lamp is designed and constructed of materials that will prevent the ignition of explosive mixtures of methane and air by protecting the bulb from breakage and preventing exposure of the hot filament, no separate safety device is required. Alternative designs will be evaluated by mechanical impact tests, temperature tests and thermal shock tests to determine that the protection provided is no less effective than a safety device.

(2) *Safety device (protection).* The design of the safety device and the housing which protects it shall be such that the action of the safety device is positive; yet the lamp shall not be too readily extinguished during normal service by the unnecessary operation of the device.

(3) *Locks or seals.* For lamps other than flashlights, all parts, such as bulb housing and battery container, through which access may be had to live terminals or contacts shall be adequately sealed or equipped with magnetic or other equally reliable locks to prevent opening by unauthorized persons. For flashlights, provision shall be made for sealing the battery container.

(4) *Battery current restricted.* Unless all current-carrying parts including conductors, are adequately covered and protected by the sealed or locked compartments, the maximum possible current flow through that part shall be limited by battery design, or by an enclosed-type fuse inside the sealed or locked container, to values that will not produce sparks or arcs sufficient to ignite an explosive mixture of methane and air.

(b) *Protection against bodily hazard.* This hazard is chiefly due to the possible burning of the user by electrolyte spilled from the battery. MSHA, therefore, requires that:

(1) *Spilling of electrolyte.* The lamp shall be so designed and constructed that when properly filled the battery will neither leak nor spill electrolyte under conditions of normal use. Lamps passing a laboratory spilling test will be considered satisfactory in this respect, contingent upon satisfactory performance in service.

(2) *Corrosion of battery container.* The material of which the container is made shall resist corrosion under conditions of normal use.

[Sched. 10C, May 17, 1938, as amended at 5 FR 3467, Aug. 30, 1940; 54 FR 30513, July 20, 1989]

§ 20.9 Class 2 lamps.

(a) *Safety.* (1) Unless special features of the lamp prevent ignition of explosive mixtures of methane and air by the broken bulb or other igniting sources within the lamp, the bulb and all spark-producing parts must be enclosed in explosion-proof compartments.

(2) Explosion-proof compartments will be tested while filled and surrounded with explosive mixtures of Pittsburgh natural gas¹ and air. A sufficient number of tests of each compartment will be made to prove that there is no danger of ignition of the mixture surrounding the lamp by explosions within the compartment. The lamp will not pass the above tests, even though the surrounding explosive mixtures are not ignited, if external flame is observed, if excessive pressures are developed, or if excessive distortion of any part of the compartment takes place.

(3) Glass-enclosed parts of such compartments must be guarded and be of extra-heavy glass to withstand pick blows, and be adequately protected by shrouds or by an automatic cut-out that opens the lamp circuit if the enclosure is broken.

(4) When an explosion-proof enclosure consists of two or more parts that are held together securely by bolts or some suitable means to permit assembly, the flanges comprising the joints between parts shall have surfaces with metal-

¹ Investigation has shown that for practical purposes Pittsburgh natural gas (containing a high percentage of methane) is a satisfactory substitute for pure methane.